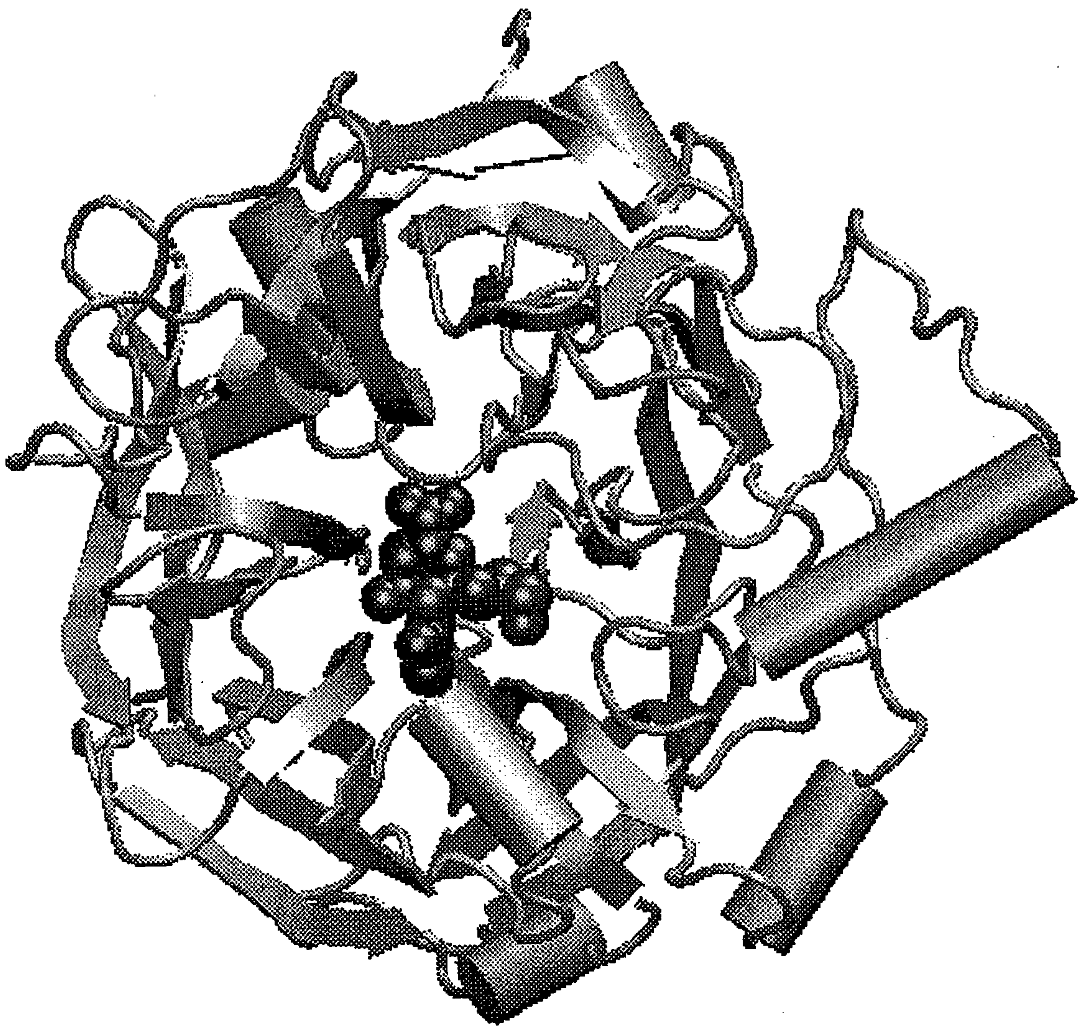

Fig. 1

10620" STSST660

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Sendai       TIAVHHAEG APLEPHSFWRCPVGEPYLSSDPKISLLLGPSLLSGS TIS V L LSIGEAIYA SS L TQG A IGK Y VLQL YISLNSDMFP
PIV1         TIAIHHADG SPLDPHDFWRCPVGEPLLSNNPNISLLPGPSLLSGS TIS V L LSIGDAIYA SS L TQG A IGK Y VLQL YISLNSDMYP
PIV3         RIT..HDVG KPLNPDDFWRCTSGLPSLMKTPKIRLMPGPGLLAMP TVD V T LVINDLIYA TS L TRG Q IGK Y VLQI IITVNSDLVP
SV5          AALINDNRY NGINQFYFSIAEGRNLTL..GP...LLNMPSFIPTA TPE T I FSLTKTHWC TH V LNG Q HVS N FVSM IIEPTSAGFP
PIV2         NLLLHDAAY NGLNKFLVLKSYNGTPKY..GP...LLNIPSFIPSA SPN T I FSLIKTHWC TH V LGD L FTT N YLAM IIQQSAAAFP
Mumps        IPLVNDLRF NGINKFIIEDYATHDFSI..GH...PLNMPSFIPTA SPN T I FSLGKTHWC TH V NAN K HTS N YISM ILVQTASGYP
NDV   (124)  GAPIHDPDF GGIGKELIVDNASDVTSFYPSA...FQEHLNFIPAP TGS T I FDMSATHYC TH V LSG R HSH H YLAL VLRTTATGRI
                       β5S0     β6S4                              β1S1        β1S2                β1S3

Sendai       DLNPVVSHTYDIND VVATGTRGYQL SMPTVD RT SSDGIEDLVLDVLDLKGSTKSHRYRNSEVDLDHPFSALY SV N IATEGSLI LG
PIV1         DLKPVISHTYDIND VIAAGTRGYQL SLPTVN TT SSEGIEDLVFDILDLKGKTKSHRCKNEDITFDHPFSAMY SV S IKIENTLI LG
PIV3         DLNPRISHTFNIND LALLNTDVYQL STPKVD RS ASSGIEDIVLDIVNHDGSISTTRFKNNNISFDQPYAALY SV P IYYKGKII LG
SV5          FFRTLKTLYLSDGV ISTVPGGCMMY FVSTQP RD FSAAPPEQRIIIMYYNDTIVERII..NPPGVLDVWATLN GT S VYYLGWVL PI
PIV2         IFRTMKTIYLSDGI VTAIPGGCVLY YVATRS KE ATTDLAELRLAFYYYNDTFIERVI..SLPNTTGQWATIN AV S IYHLGFIL PV
Mumps        MFKTLKIQYLSDGL IATVPDGCAMY YVSTQL TD AGSSPPTQKLTLLFYNDTVTERTI..SPTGLEGNWATLV GV S IYFENKLI PA
NDV   (220)  FFSTLRSISLDDTQ VSATPLGCDML SKVTET EE NSAVPTLMAHGRLGFDGQYHEKDL..DVTTLFEDWVANY GV G SFIDGRVW SV
             β1S4           β2S1        β2S2      α1     β2S3      β2S4    α2      β3S1a    β3S1b β3S2

Sendai       LTTPLQGDTKCRT.........QG QQVSQDTCNEALKI...TWLGGKQVVNVIIRVNDYLSERPKIRVTTIPITQNYLGAGRLLKLGDRVYIIT
PIV1         LTTPLQGDTKCVT.........NR ANVNQSVCNDALKI...TWLKKRQVVNVLIRINNYLSDRPKIVVETIPITQNYLGAEGRLLKLGKKIYIIT
PIV3         GLEHPINENAICNT.........TG PGKTQRDCNQASHS...PWFSDRRMVNSIIVVDKGLNSIPKLKVWTISMRQNYWGSEGRLLLLGNKIYIYT
SV5          GGVIKGTSLWNNQANKYFIPQMVAAL SQNQATQVQNAKSSYYSSWFGNRMIQSGILACPLRQDLTNECLVLPFSNDQVLMGAEGRLYMYGDSVYYYQ
PIV2         GGLIKGTPSYNKQSSRYFIPKHPNIT AGKSSEQAAAARSSYVIRYHSNRLLQSAVLICPLSDMHTARCNLVMFNNSQVMMGAEGRLYVIDNNLYYYQ
Mumps        GGVLPNSSLGVKSAREFFRPVNPYNP SGPQQDLDQRALRSYFPSYFSNRRVQSAFLVCAWNQILVTNCELVVPSNNQTLMGAEGRVLLINNRLLYYQ
NDV   (317)  YGGLKPNSPSDTVQEGKYVIYKRYNDT PDEQDYQIRMAKSSYKPGRFGGKRIQQAILSIKVSTSLGEDPVLTVPPNTVTLMGAEGRILTVGTSHFLYQ
             β3S2    α3                    α4              β3S3        β3S4                β4S1    β4S2

Sendai       SSGWHSQLQIGVLDV....SH..PLTINWTPHEALS NKE NWYNT KE IS T AYP SPDAAN.........VATVT YANTS V TIM
PIV1         SSGWHSHLQIGSLDI....NN..PMTIKWAPHEVLS NQD NWYNR RE IS T AYP SPDAVN.........VATTT YANTS V TIM
PIV3         STSWHSKLQLGIIDI....TDYSDIRIKWTWHNVLS NNE PWGHS DG IT T AYP NPTGSI.........VSSVI DSQKT V VIT
SV5          SNSWWPMTMLYKVTITFTNGQPSAISAQNVPTQQVP TGD SATNR GF LT A AWL TNPSSTS..TFGSEATFTGSY NTATQ I TMY
PIV2         SSSWWSASLFYRINTDFSKGIPPIIEAQWVPSYQVP VMP NATSF AN IT A VWP NDPEPTSQNALNPNYRFAGAF RNESN T TFY
Mumps        STSWWPYELLYEISFTFTNSGQSSVNMSWIPIYSFT SGN SGENV TA VS L PWP TPYSHQS..GINRNFYFTGAL NSSTT V TLY
NDV   (416)  GSSYFSPALLYPMTV....SNKTATLHSPYTFNAFT SIP QASAR NS VT T PYP IFYRNHTLRGV......FGTM DSEQA L ASA
                          β4S3        β4S4                       β5S1          β5S2           β5S3

Sendai       YSNTTNIINMLRIKDVQLEVA TTISS ITHFGKG.. FH I INQKSLNTLQPMLFKTSIPKLCKAES
PIV1         YSNTSEIINMLRLKNVQLEAA TTTS. ITHFGKG.. FH V INQTSLNTLQPMLFKTSIPKICKITS
PIV3         YSTATERVNELAIRNKTLSAG TTTS. ITHYNKG.. FH V INHKSLDTFQPMLFKTEIPKSCS
SV5          IANNTQIISSQQFGSSGQEAA GHTT. FRDTGSVMV IY I LSSSLLGQFQIVPFIRQVTLS
PIV2         TASASALLNTTGFNNTNHKAA TSST. FKNTGTQKI LI I MGSSLLGEFQIIPFLRELIP
Mumps        VSALNNLKVLAPYGNQGLFAS TTTT. FQDTGDASV VY M LASNIVGEFQILPVLTRLTIT
NDV   (505)  VFDSTSRSRITRVSSSSTKAA TTST. FKVVKTNKT LS A ISNTLFGEFRIVPLLVEILKNDGVREARSG
             β5S3  β5S4            β6S1          β6S2         β6S3
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Figure 2

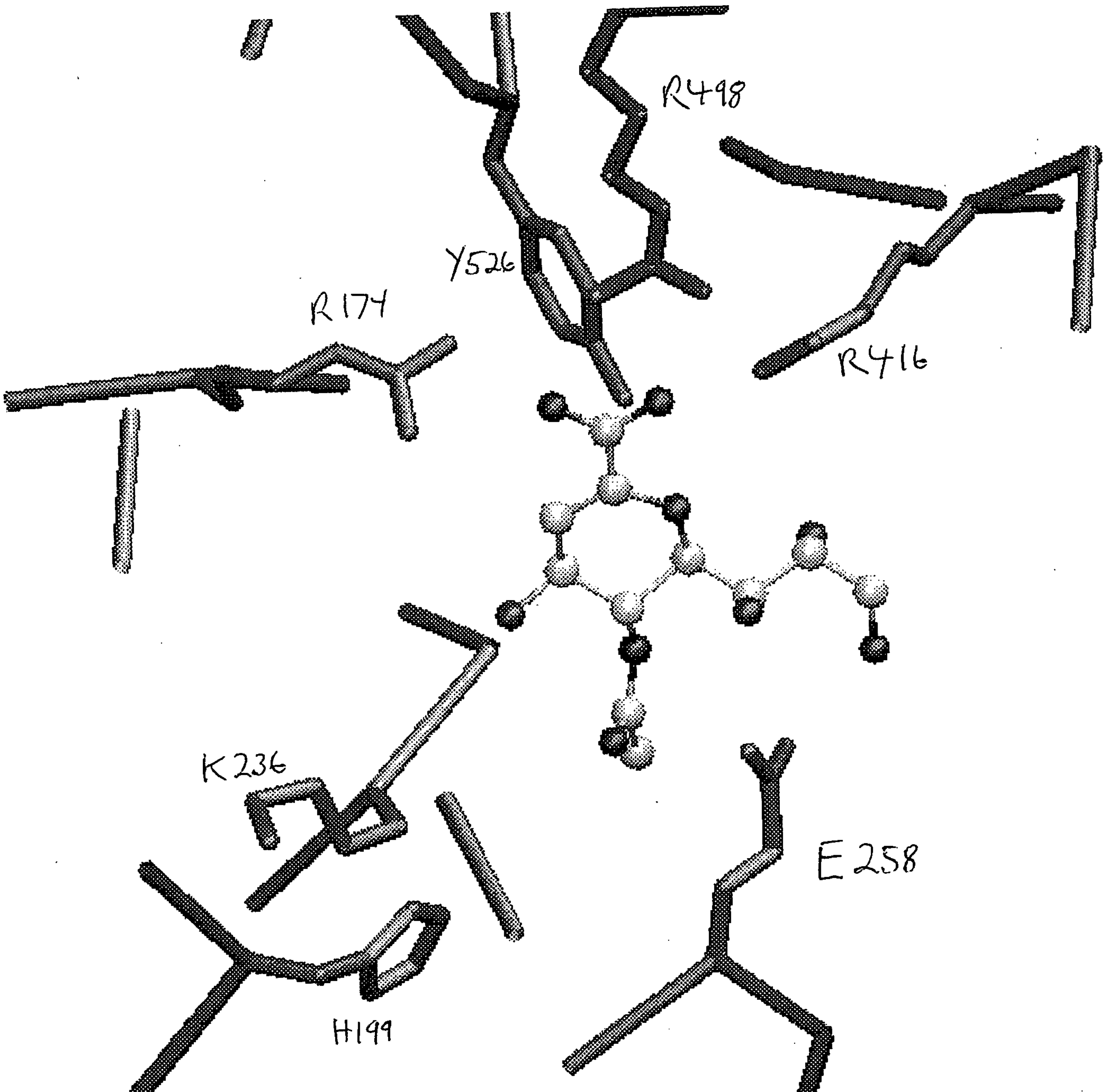

Fig. 3

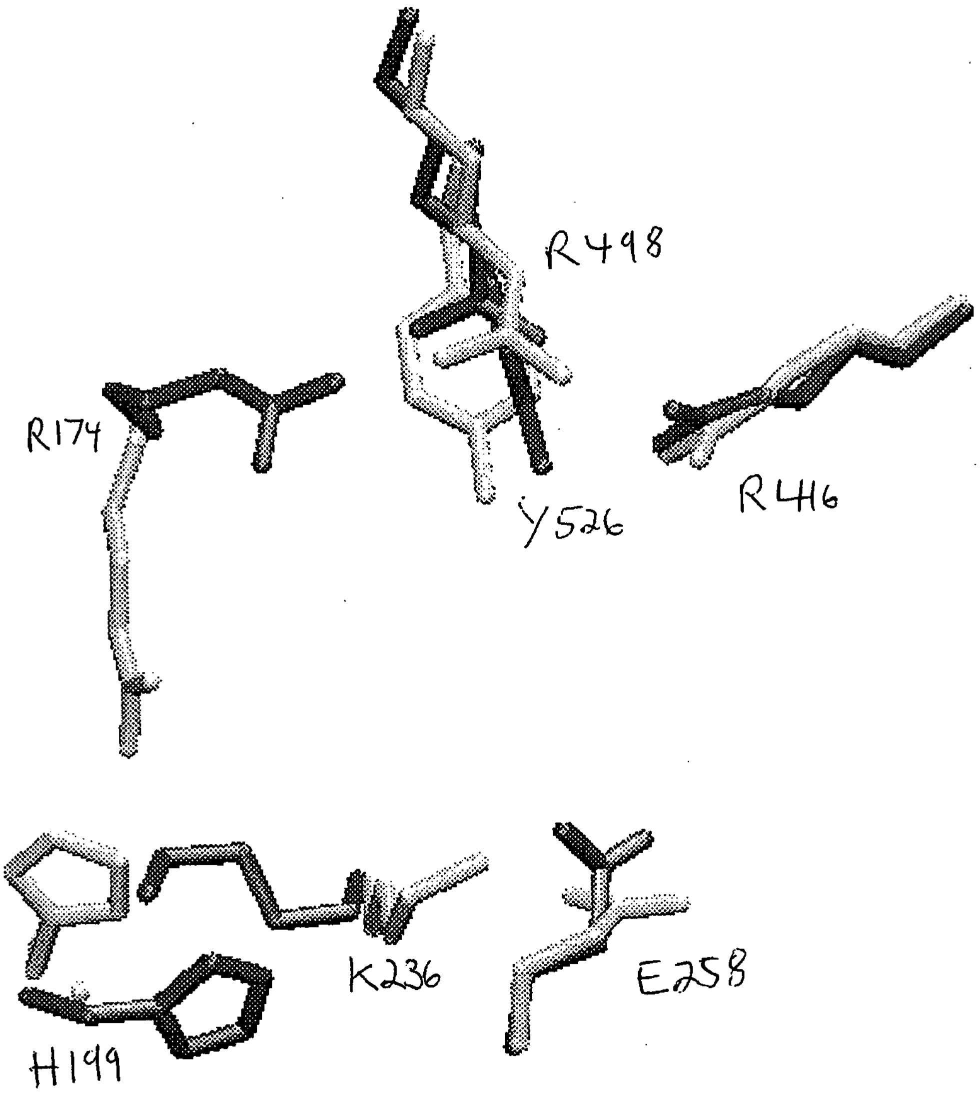

Fig. 4

	Native 1	Native 2	Native 3	Native 4	NANA	DANA
Cell (Å)	73.3	72.3	71.7	72.0	71.6	137.5
	78.0	77.9	77.9	83.8	77.6	137.5
	202.6	199.2	198.2	201.5	197.2	116.6
Temp(K), pH	293, 7	100, 4.6	100, 4.6	293, 6	100K, 4.6	100K,6.5
Resolution (Å)	3.0	2.0	2.5	3.0	2.5	2.8
# obs	172104	623166	420703	277932	210555	498619
# unique	20022	68217	38168	22207	29671	38673
Completeness(%)	83	86	97	88	76	94
R_{merg} (%)	9.3	4.9	3.1	9.3	4.2	5.2
R-factor			0.222		.223	0.209
R_{free}			0.277		.291	0.235
# protein atoms			6914		6914	6896
# CHO, Ca,			89		116	111

Fig. 5

ligands			
# waters	211	207	239
<B> A, B Å^2	25,36	32,44	44,44
<B> ligand Å^2		38,57	48,41

Table 1 Crystallographic data and refinement statistics.

Datasets Native2, Native3, NANA and DANA from frozen crystals were collected on beamlines X11 and BW7A at DESY, Hamburg. All other datasets were collected on in-house rotating anode and image plate or multiwire detector systems.

$R_{merge} = \Sigma_{hkl} \Sigma_i |\Sigma I^i_{hkl} - \langle I_{hkl} \rangle| / \Sigma_{hkl} \Sigma_i \langle I^i_{hkl} \rangle$ where the sum *i* is over all separate measurements of the unique reflections hkl.

$R\text{-factor} = \Sigma_{hkl} ||F_{obs}| - |F_{calc}|| / \Sigma_{hkl} |F_{obs}|$

R_{free}, as R-factor but summed over a 10% test set of reflections.

Fig. 5 (continued)